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December 6, 2000

United States Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pa. 19406
Attention: Marie Miller

Re: Decommissioning Plan and Cost Estimate for license no. 37-00030-02
Revisions & Submittal of the Decommissioning Cost Estimate for license no. 37-00030-08

Dear Ms. Miller,

Enclosed are revised pages for the Decommissioning Cost Estimate and the Decommissioning Plan. Please replace these pages in the submittal that you have and destroy the ones that are replaced. Attachment 1 is in its entirety and should replace the Attachment 1 in the Decommissioning Plan. All the above is for License No. 37-00030-02.

Although you are not involved with license no. 37-00030-08, I have included the Decommissioning Cost Estimate for license no. 37-00030-08 with the above items. This satisfies Condition 20. B of that license. Please route this to whom it may concern.

If you have any further questions, please do not hesitate to contact me.

Very Truly Yours,

Larry Harmon

Larry Harmon,
Plant Manager

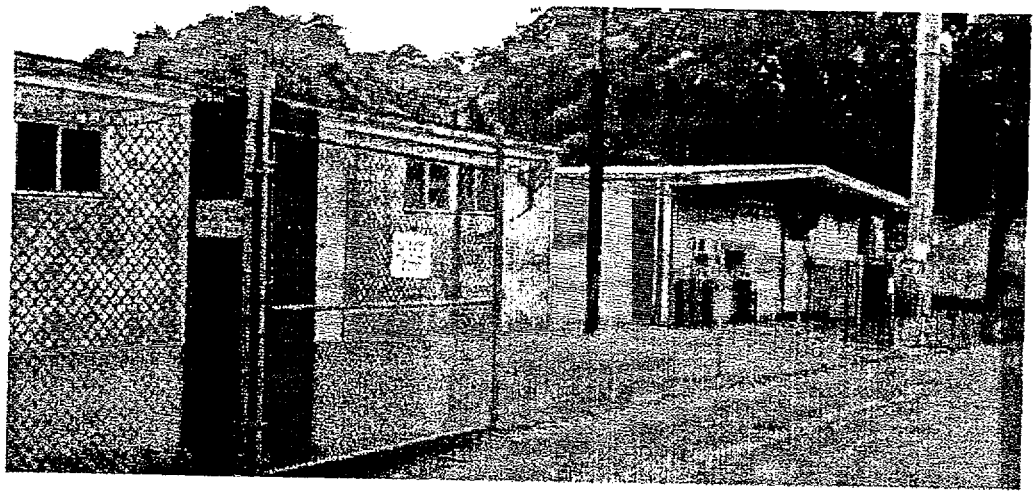
128944

NMSS/RGN MATERIALS-002

Decommissioning Cost Estimate for Safety Light Corporation Bloomsburg, Pennsylvania

NRC Material License No. 37-00030-08

Revision 0 November 2000



Prepared for:
Safety Light Corporation
Bloomsburg, Pennsylvania

Prepared by:
GTS Duratek

Radioactive Solutions
Commercial Services
628 Gallaher Rd.
Kingston, TN 37763

128944

DECOMMISSIONING COST ESTIMATE

for

SAFETY LIGHT CORPORATION
BLOOMSBURG, PENNSYLVANIA
NRC Material License No. 37-00030-08

Revision 0
October 2000

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PROPRIETARY STATEMENT

This document is the property of the Safety Light Corporation, and furnished with the understanding that the information herein will be held in confidence and will not be duplicated, used or disclosed either in whole or part without the written permission of the Safety Light Corporation.

EXECUTIVE SUMMARY

GTS Duratek, Inc. performed an independent cost estimate for decommissioning portions of the Safety Light Corporation facility located in Bloomsburg, Pennsylvania that are covered by NRC License No. 37-00030-08. Condition 20B of this license requires that Safety Light provide "a cost estimate for decommissioning of facilities and equipment authorized by this license, including disposal of wastes generated by activities authorized by this license. The cost estimate shall be based on compliance with the criteria in 10 CFR Part 20, Subpart E, *Radiological Criteria for License Termination.*" This estimate was prepared at the request of the Safety Light Corporation to satisfy this license commitment.

This cost estimate was developed using a systematic approach. Decommissioning criteria were identified and 1995 characterization survey data were reviewed. Specific and general information regarding equipment and structures was used in determining decontamination and demolition methodologies in order to minimize overall decommissioning costs.

This estimate includes itemized costs for manpower and equipment resources, radioactive waste volume reduction, packaging, shipping and burial activities, and the performance of final status surveys for buildings and structures. The estimated decommissioning cost is $5,621,360 in terms of 2000 dollars. This estimate is for budgetary purposes only and is not a proposal for GTS Duratek, Inc. to perform the decommissioning work.

A significant portion of the overall decommissioning costs is attributed to the processing or burial of radioactive waste. The radioactive waste disposal rate used for most of the waste in this estimate was based on shipping to Envirocare of Utah and upon negotiating a favorable rate with Envirocare of Utah based on a large waste volume and low levels of activity.

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1.0 INTRODUCTION

1.1 Purpose

GTS Duratek (GTSD) has prepared this document for the purpose of providing a cost estimate for decommissioning portions of the Safety Light Corporation that are covered by NRC License No. 37-00030-08. Condition 20B of this license requires that Safety Light provide "a cost estimate for decommissioning of facilities and equipment authorized by this license, including disposal of wastes generated by activities authorized by this license. The cost estimate shall be based on compliance with the criteria in 10 CFR Part 20, Subpart E, *Radiological Criteria for License Termination.*" This estimate was prepared at the request of the Safety Light Corporation to satisfy this license commitment.

The estimate includes only activities and cost factors necessary to reduce residual radioactivity to levels that will permit release of the associated structures, buildings and grounds for unrestricted use.

Costs associated with the demolition and removal of non-contaminated equipment or structures are not included in this cost estimate unless such activities are required to support decommissioning. An actual date to complete the site decommissioning has not been projected. The cost estimate provided by this report is in terms of 2000 dollars.

1.2 Scope

The scope of this report is to present the estimated costs derived for decommissioning portions of the Safety Light Corporation that are covered by NRC License No. 37-00030-08. The specific areas covered by this estimate include:

- Nuclear Building (#12)
- Machine Shop (#11)
- Solid Waste Building (#10)
- Liquid Waste Building (#8)
- Restricted Area Soils

Decommissioning costs are directly related to the degree of remediation required and the amount of radioactive waste generated. The extent of remediation is based on radiological data, proven decontamination processes and data from similar projects. The volume and weight of radioactive waste was estimated based on data obtained from site drawings, and direct measurements in the facility.

1.3 Assumptions and Bases

The following assumptions and bases were used in developing the cost estimate.

- The machine shop, solid waste building and liquid waste building will be demolished as part of this decommissioning scope. The nuclear building will remain in place after decommissioning. The nuclear building will be decontaminated, if required, and free released, but it will not be refurbished if required to make it useable.

- Uncontaminated processing equipment can have high intrinsic values and will be used at another location or sold during decommissioning. There was no cost included for decommissioning this equipment and no salvage value credit taken for this equipment.

- Contaminated equipment will be decontaminated on site, processed at a volume reduction facility prior to disposal, or sent directly to a licensed radioactive material disposal site. The waste processing facility is assumed to be the GTS Duratek facility located approximately 670 miles away in Oak Ridge, Tennessee.

- Radioactive waste with low specific activity will be sent to Envirocare of Utah. It was assumed that partially decontaminated equipment, protective clothing wastes, removed concrete, miscellaneous DAW and soil would qualify for disposal at Envirocare of Utah.

- Radioactive waste not suitable for disposal at Envirocare of Utah can be sent to the Barnwell, South Carolina disposal site. However, all waste qualified for disposal at Envirocare of Utah under their current license and waste acceptance criteria.

- The site remediation contractor will provide most of the demolition equipment and survey instrumentation at prevailing rates.

- Local decontamination technicians and supervisors will be used to staff this project; therefore, no travel and living funds are included for them. Health physics technicians and supervisors and project management personnel will not be local hires; therefore, funds for travel and living expenses were included.

- Construction labor rates were obtained from 2000 RS Means Building Construction Cost Data for Harrisburg, Pennsylvania.

2.0 GENERAL FACILITY DESCRIPTION

The Safety Light Corporation site is located in South Centre Township of Columbia County in central Pennsylvania, about 6 miles east of Bloomsburg and 6 miles west of Berwick. The north site boundary is the Old Berwick Road and the south site boundary is the Susquehanna River. Safety Light Corporation owns the Vance/Walton property located along the southeast corner of the site. Other residential tracts of land are adjacent to the east and west boundaries of the site. Safety Light Corporation occupies approximately 2 acres of the 10-acre site. The current product line includes a variety of tritium-based products:

- self-luminous safety devices for use in commercial/military aircraft, commercial buildings, and marking of aircraft and helicopter landing areas;
- research and industrial applications;
- titanium tritide-coated rods and pins for use in military and industrial type electron tubes; and
- tritium targets for use in neutron-generating devices.

Safety Light leases the remaining 8 acres of the site to USR Metals, Inc., who conducts non-radioactive operations involving the manufacture of dials, nameplates, and other specialty products used in a variety of industrial and military applications. Their operations also involve anodizing of aluminum products, and application of specialty protective films to the surfaces of various metal items.

An old aerial photograph of the site appears in Figure 2-1, Safety Light Facility. Figure 2-2, Plan of Safety Light Facility, shows existing buildings and features. This decommissioning cost estimate only addresses the nuclear building, machine shop, solid waste building, and liquid waste building, and land within the restricted area which support current operations under NRC License 37-00030-08. Other structures within the NRC License No. 37-00030-08 restricted area (strontium-90 sources vault, old radium vault, 8 x 8 building, old house, above-ground silo, old garage foundation), and the land and structures outside the restricted area fence on Safety Light Corporation property are addressed in a separate decommissioning cost estimate.

The *Characterization Survey of Safety Light Corporation Site at Bloomsburg, Pennsylvania U.S.A* (Monserco 1996) documents available information on site history from the 1940's through 1995.

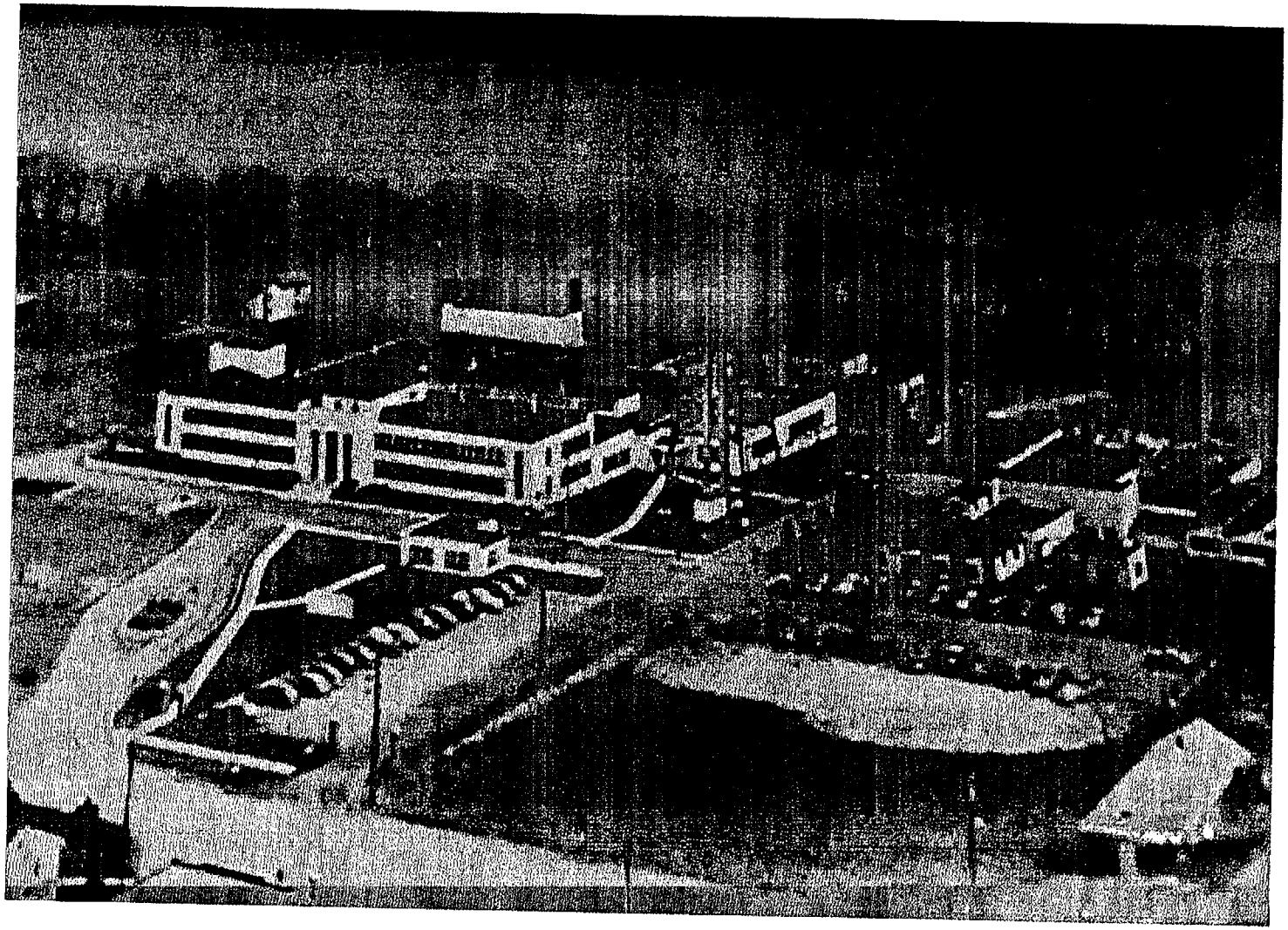


Figure 2-1, Safety Light Facility, circa 1950

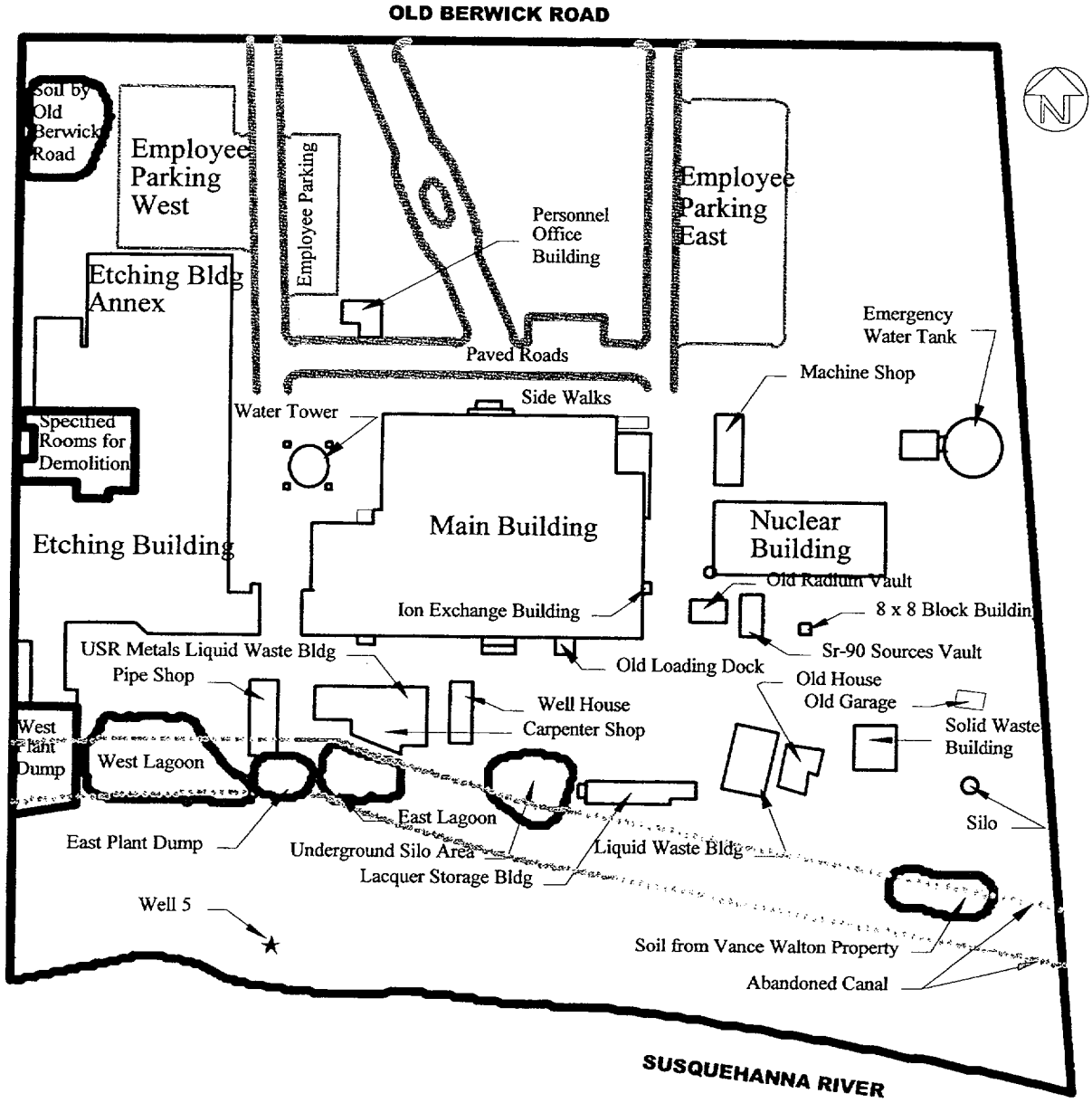


Figure 2-2, Plan of Safety Light Facility

3.0 DECOMMISSIONING CRITERIA

GTS Duratek engineers visited the Safety Light facility in Bloomsburg, Pennsylvania in June 2000 to gather physical and radiological data. Facility sketches, building sketches, and radiological data for affected areas were obtained. Onsite staff members were interviewed to determine the radiological history of affected areas and the site in general.

3.1 Radionuclides of Interest

The principle radionuclides of interest at the Safety Light site are cesium-137, radium-226, strontium-90, americium-241 and tritium. While current operations involve only tritium, portions of the buildings addressed in this cost estimate may be contaminated with other radionuclides due to past operations.

3.2 Radiological Criteria for License Termination

NRC regulations (10 CFR 20.1402) contain two separate and independent requirements for license termination:

- a 25 mrem per year dose limit must be met, and
- levels of residual radioactivity must be ALARA.

There are at least three methods to demonstrate compliance with the license termination ALARA requirement:

- the quantitative method in DG-4006, *Demonstrating Compliance with the Radiological Criteria for License Termination*, including the D&D code; (NRC 1998b)
- by reference to other appropriate analyses (e.g., the Generic Environmental Impact Statement, NUREG-1496); and
- qualitative judgments (e.g., good practice, engineering judgment, unreasonable expense).

This report applies the quantitative method in DG-4006.

The proposed Derived Concentration Guideline Levels (DCGLs) for surface contamination at the Safety Light facility were calculated using RESRAD-BUILD and the ALARA calculation methodology from DG-4006 (NRC 1998b) (Refer to

Attachment 1, Safety Light Dose Assessment, of the current decommissioning plan.) Buildings with surface contamination below these levels will be deemed acceptable for release for unrestricted use provided that (NRC 2000):

- Residual radioactivity has been reduced to levels that are "as low as is reasonably achievable" (ALARA),
- The residual radioactivity is contained in the top layer of the building surface (i.e., there is no volumetric contamination), and
- The fraction of removable surface contamination does not exceed 0.1.

The proposed DCGLs for surface soil (top 15 centimeters) contamination were calculated using RESRAD. (Refer to Attachment 1, Safety Light Dose Assessment, of the current decommissioning plan). These levels will be deemed acceptable for release for unrestricted use provided that (NRC 2000):

- Residual radioactivity has been reduced to levels that are ALARA,
- The residual radioactivity is contained in the top layer of the surface soil (i.e., a thickness of approximately 15 cm),
- The unsaturated zone and the groundwater are initially free of radiological contamination, and
- The vertical saturated hydraulic conductivity at the specific site is greater than the infiltration rate.

Additional subsurface soil analyses were required for the Safety Light site because there is activity below the surface soil layer. Attachment 1, Safety Light Dose Assessment, of the current decommissioning plan describes the RESRAD runs used to assign DCGLs for areas of soil with subsurface contamination. The numerical release criterion proposed for demonstrating that the dose criterion has been met for soils will be that the sum-of-fractions (quotients of concentrations and DCGLs) of contributing radionuclides shall be less than unity. If a survey unit fails to meet this numerical release criterion, the need for additional sampling or remediation will be evaluated. The following table lists the proposed DCGLs for surfaces and soil.

Table 3-1: DCGLs for Surfaces and Soil

Radionuclide	Surface Contamination DCGL ($dpm/100cm^2$)	Soil with Surface Contamination (to 15 cm) DCGL (pCi/g)	Soil with Subsurface Contamination (to 2 m deep) DCGL (pCi/g)
H-3	1.1 E+08	11,420	1,024
Sr-90	43,160	30.1	5.0
Cs-137	40,500	14.1	11.0
Ra-226 + C	2,170	4.1	1.5
Am-241	112	10.0	1.0

+C indicates the value for radium-226 with its decay progeny in equilibrium. This value is the concentration of the parent radionuclide, but accounts for contributions from the complete chain of progeny in equilibrium with the parent radionuclide.

3.3 Characterization Data

The 1995 site characterization (Monserco 1996) included direct measurements of accessible structures and equipment and soil and water sampling. The principle radionuclides of interest are cesium-137, radium-226, and americium-241. Cobalt-60, strontium-90, polonium-210, and tritium were also detected.

The characterization report included data for the machine shop, solid waste building, and liquid waste building, which are addressed in this decommissioning cost estimate. The 1995 characterization did not include measurements in the nuclear building. This cost estimate assumes that the outdoor areas and buildings within the NRC License 37-00030-08 restricted area not used for current operations will be remediated to meet DCGL values prior to the start of the decommissioning activities covered by this cost estimate.

4.0 ESTIMATION METHODS

The estimated cost to decommission the licensed areas at the Safety Light Corporation facility is $5,621,360. This section of the cost estimate report provides an overview of the considerations and factors that influenced the decommissioning cost estimate. Table 4-1 provides a summary of the costs associated with each area of the facility.

Table 4-1: Decommissioning Cost Summary – Safety Light Facility

Operation	Man-hours	Labor	Equipment, Contracts & Supplies	Radwaste Shipping and Disposal	Total* Cost
Nuclear Building (#12)	5,042	$285,465	$64,202	$232,256	$581,923
Machine Shop (#11)	2,391	$129,216	$58,119	$308,302	$495,637
Solid Waste Building (#10)	1,592	$87,531	$37,021	$327,667	$452,219
Liquid Waste Building (#8)	4,947	$262,118	$173,516	$1,953,809	$2,389,443
Restricted Area Soils	424	$22,478	$18,391	$168,942	$209,811
Characterization Survey	585	$35,497	$6,747		$42,244
Final Survey	2,340	$141,988	$26,990		$168,977
Planing Training & Mobilization	716	$33,751			$33,751
Safety Light Oversight	667	$66,667			$66,667
Regulatory & Licensing	520	$36,416			$36,416
NRC Verification Survey					$20,000
TOTALS	19,224	$1,101,126	$384,98	$2,990,976	$4,497,088
			25%	Contingency	$1,124,272
				Grand Total	**$5,621,360**

4.1 Cost Modifying Factors

There are modifying factors that significantly affect the overall cost for remediation. One of these factors is an adjustment for productivity related to personnel protection requirements and working temperatures. The degree of protection required depends upon the extent of contamination and specific activities to be performed in a given area. As the level of personnel protection increases, so does the impact on individual productivity and task duration. Adjustments were made to account for the implementation of personnel protective measures where applicable. This estimate used the standardized levels of personnel protection described in Table 4-2: Personnel Protective Equipment Protection Summary. The productivity factors related to these levels of personnel protection are provided in Table 4-3 for Light Work and in Table 4-4 for Heavy Work.

Table 4-2: Personnel Protective Equipment Protection Summary

Level A:	The highest available level of respiratory, skin, and eye protection
Level B:	The highest level of respiratory protection, but less skin protection than Level A. Level B is the minimum level recommended for initial site entries, or for other entry conditions dealing with unknown hazards.
Level C:	The same level of skin protection as Level B, but a lower level of respiratory protection.
Level D Modified:	Skin protection similar to or the same as Level C, without respiratory protection.
Level D:	Standard work uniform suitable for construction work: no respiratory protection and minimal skin protection.

Table 4-3: Hazardous and Toxic Waste Productivity Factors: Light Work

Variables	U/M	Level A			Level B			Level C			Level D Modified			Level D		
		T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85
A. Standard losses	Min.	160	160	160	140	140	140	128	128	128	76	76	76	32	32	32
B. Scheduled/heat stress breaks	Min.	60	90	120	43	65	86	35	63	101	30	47	63	30	33	44
C. Dexterity losses	Min.	78	69	60	74	69	64	55	51	44	4	4	3	5	5	5
D. Total time lost per 8-hr. WD	Min.	298	319	340	257	274	290	218	242	273	110	127	142	67	70	81
E. Productivity time per 8-hr. WD	Min.	182	161	140	223	206	191	262	238	207	370	353	338	413	410	399
F. Productivity time on clean site	Min.	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
G. HTW Productivity Factor		**0.42**	**0.37**	**0.33**	**0.52**	**0.48**	**0.44**	**0.61**	**0.55**	**0.48**	**0.86**	**0.82**	**0.79**	**0.96**	**0.95**	**0.93**

Notes:

- Standard delays account for all time losses independent of temperature variations. They include safety meetings, instructions, putting on and taking off of PPE, decontamination, switching air supply/filters, monitoring delays, and cleanup.
- Scheduled/heat stress breaks account for all paid rest periods per workday.
- Dexterity losses are based on subjective opinions of the percentage that PPE slows down a normal worker because of factors such as discomfort, clumsiness, weight, and restricted breathing and communication. The number of minutes actually worked is reduced by the percentage representing the average response for that particular PPE level.
- Values for A, B, and C were derived by averaging the survey responses for each PPE level. Responses that varied greatly from the average were subject to omission at the author's discretion.
- Total paid time = 480 minutes.
- 50-minute delay on clean site = 10-minute safety meeting and instructions + 10-minute cleanup + 30-minute breaks.
- Calculations:

D= A + B + C	U/M = unit of measure
E = 480 - D	WD = workday
F = 480 - 50	Min. = minutes
G = E/F	T = temperature (Fahrenheit)

Level A-protection is used in extreme emergency situations only. Productivity factors for Level A should be used with caution because they were extrapolated from 2 data points.

Table 4-4: Hazardous and Toxic Waste Productivity Factors: Heavy Work

Variables	U/M	Level A			Level B			Level C			Level D Modified			Level D		
		T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85	T<70	70<T	T>85
A. Standard losses	Min.	220	220	220	204	204	204	135	135	135	76	76	76	28	28	28
B. Scheduled/heat stress breaks	Min.	60	105	150	50	75	123	64	131	178	30	90	165	30	45	60
C. Dexterity losses	Min.	80	62	44	52	46	35	44	34	26	28	24	18	11	10	10
D. Total time lost per 8-hr. WD	Min.	360	387	414	306	325	362	243	300	339	134	190	259	69	83	98
E. Productivity time per 8-hr. WD	Min.	120	93	66	174	155	118	237	180	141	346	290	221	411	397	382
F. Productivity time on clean site	Min.	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
G. HTW Productivity Factor		**0.28**	**0.22**	**0.15**	**0.40**	**0.36**	**0.27**	**0.55**	**0.42**	**0.33**	**0.80**	**0.68**	**0.51**	**0.96**	**0.92**	**0.89**

Notes:

- Standard delays account for all time losses independent of temperature variations. They include safety meetings, instructions, putting on and taking off of PPE, decontamination, switching air supply/filters, monitoring delays, and cleanup.
- Scheduled/heat stress breaks account for all paid rest periods per workday.
- Dexterity losses are based on subjective opinions of the percentage that PPE slows down a normal worker because of factors such as discomfort, clumsiness, weight, and restricted breathing and communication. The number of minutes actually worked is reduced by the percentage representing the average response for that particular PPE level.
- Values for A, B, and C were derived by averaging the survey responses for each PPE level. Responses that varied greatly from the average were subject to omission at the author's discretion.
- Total paid time = 480 minutes.
- 50-minute delay on clean site = 10-minute safety meeting and instructions + 10-minute cleanup + 30-minute breaks.
- Calculations:
  - D= A + B + C
  - E = 480 - D
  - F = 480 - 50
  - G = E/F
  - U/M = unit of measure
  - WD = workday
  - Min. = minutes
  - T = temperature (Fahrenheit)
- Level A-protection is used in extreme emergency situations only. Productivity factors for Level A should be used with caution because they were extrapolated from 2 data points.

4.2 Radioactive Waste Volume Estimates

The volume of radioactive waste requiring treatment and disposal can be a very significant modifying factor due to the high cost for radioactive waste disposal. For the Safety Light decommissioning, the cost for radioactive waste processing, shipping, and disposal is anticipated to be about 67% of the total decommissioning cost. Radioactive waste volume estimates are discussed in the following section. Table 4-5 provides an unprocessed waste volume summary for each area of the Safety Light facility.

Table 4-5: Safety Light Unprocessed Radioactive Waste Summary

Area Description	Contaminated Waste Volume (ft^3)	Contaminated Waste Weight (lb)	Generated Waste Volume (ft^3)
Nuclear Building (#12)	2,774	164,516	66
Machine Shop (#11)	3,716	189,712	27
Solid Waste Building (#10)	3,965	175,840	18
Liquid Waste Building (#8)	23,913	1,687,193	54
Restricted Area Soils	2,062	149,824	11
TOTALS	**36,429**	**2,367,084**	**176**

4.3 Radioactive Waste Disposal Costs

A significant portion of the overall decommissioning cost is generally attributed to the processing or burial of radioactive waste. For many sites, the material to be disposed of is first processed to the maximum extent possible. This can result in a significant reduction in the final cost for waste disposal. Current GTSD rates were used to assess the costs and benefits of waste processing for the Safety Light decommissioning project. This analysis revealed no benefit to incorporating volume reduction processes in the cost estimate. For example, the cost to metal melt or decontaminate a contaminated tank was more than the cost to cut up the tank and ship it directly to Envirocare of Utah for disposal at a $62.10 per cubic foot disposal rate. The costs to transport waste to the Envirocare of Utah disposal site are based on a transport distance of 2,109 miles, at a rate of $1.95 per mile.

4.4 Remediation Methods

The goal in choosing remediation methods is to select the minimum cost option to accomplish a task. There are many factors which need to be considered when selecting a method such as contamination levels, degree of penetration of contamination into substrate material, equipment cost, support equipment costs, material and chemical costs, the generation of secondary waste volumes (waste in addition to the removed contaminated material), processing rates, labor requirements, and applicability to various tasks. Typical decontamination processes are summarized in Table 4-6. For each decontamination method, this table shows application information, the process cost per square foot of area decontaminated, and the amount of secondary waste generated. These unit factors are applied to specific areas or equipment requiring remediation to determine the most cost-effective process.

Table 4-6: Decontamination Methodology Comparison

Methodology	Application	Penetration depth (in)	Crew Size	Process Cost ($/ft²)	Secondary Waste Volume (ft³/1000 ft²)
McDonald U-5 Scabbler	Floor concrete	0.25	2.0	$0.691	0
McDonald U-5 Scabbler	Floor concrete	0.5	2.0	$1.286	0
McDonald 3WCD Scabbler	Wall concrete	0.125	2.0	$3.026	0
Blastrac 10D Shot Blaster	Floor concrete	0.063	1.1	$0.230	0.26
Blastrac 10D Shot Blaster	Floor concrete	0.125	1.1	$0.303	0.26
LTC 10-60Pn Special Vacuum Blaster	All surfaces	0.031	1.3	$1.070	0.26
LTC 10-60Pn Special Vacuum Blaster	All surfaces	0.063	1.3	$1.971	0.26
EDCO CPU-10C Floor Plane	Floor concrete	0.50	2.0	$1.154	0
CO2 Blasting	All Surfaces	0.00	2.0	$2.356	0.18
Hydrolaser (5-10,000 psi)	All Surfaces	0.00	2.0	$0.522	4.54
Hands-On-Decon	Non-Porous surfaces	0	1.0	$1.441	8.33

4.5 Radioactive Waste Volume Reduction Costs

The volume reduction processes analyzed for use are summarized in Table 4-7. For each volume reduction method, this table shows application information, transportation

container type, and the total process cost per unit weight. These unit factors are applied to specific items of equipment requiring disposal to determine the most cost-effective process. The waste generated at this facility will include ventilation systems, process equipment, concrete, steel, soil and secondary waste generated during the decontamination work such as protective clothing and materials used during manual decontamination work.

Table 4-7: Volume Reduction Methodology Cost Information

VR Methodology	Applicability	Transport Container Type	Total VR Cost ($/lb)
Super Compaction	Dry active waste, 20 lb/ft^3	B-25 for Envirocare Disposal	$7.54
Incineration	DAW	B-25 for Envirocare Disposal	$5.90
Metal Melt [1]	Metal	Custom	$0.86
Metal Decon [1]	Metal	Custom	$0.96
Survey & Release [2]	Dry Active Waste	55 Gal Drum	$1.56

1. This process recycles the processed material so there is no client waste for disposal.
2 Disposal in landfill included in cost

4.6 Unit Costs

A number of unit factors were used to generate this cost estimate. They are listed in Table 4-8 so project costs can be updated when required, and the effects of changing unit costs can be evaluated.

Table 4-8: Decommissioning Cost Estimate Selected Unit Cost Factors

Unit Cost Factor	Unit Cost Rate	Units
Radioactive Waste Disposal at Envirocare of Utah	62.10	cubic foot
Waste Transportation to Envirocare of Utah	$1.95	mile
Transportation Distance to Envirocare of Utah	2,109	miles
B-25 Waste Disposal Container Cost	$460.00	each
Management and Supervision	$91.59	hour
Engineer	$67.16	hour
Radiation Protection Supervisor	$67.16	hour
Administrative Assistant	$26.91	hour
Instrument Technician	$50.08	hour
Radiation Protection Technician	$44.67	hour
Laborer	$38.00	hour
Pennsylvania sales tax	6.25%	
Fee	15%	

4.7 Final Surveys

Final survey cost estimates are based on the method presented in Draft Regulatory Guide DG-4006, *Demonstrating Compliance With the Radiological Criteria for License Termination.* (NRC 1998b) This method requires the determination of the number of sample points for the various areas being surveyed and the type of survey being performed. The time to perform each of these surveys is determined, and the product of these two items is the labor time to perform the surveys. Equipment and material cost to perform the surveys is added along with staff support costs to determine a total cost. The survey requirements are based on NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (USEPA et. al., 1997). A spreadsheet was developed which incorporates facility dimensions, labor rates and support cost ratios to estimate the final survey cost. The facility survey labor estimate is summarized in Appendix A-6, and the open land and miscellaneous area survey labor estimate is summarized in Appendix A-7.

5.0 FACILITIES, RADIOLOGICAL CONDITIONS AND DECOMMISSIONING SCENARIO

Decommissioning of the Safety Light facility requires that residual radioactive materials be removed from the site to allow termination of the radioactive material license. For the purposes of this cost estimate, once the Safety Light facility has been remediated to release limits, no further decontamination or demolition is required. Upon acceptance of the final radiological survey report and termination of the license by the NRC, no restrictions will be imposed upon the site due to its prior use as a radioactive material processing facility.

5.1 Characterization Survey

A characterization survey will be conducted in all areas of the restricted area that have a history of radioactive materials use or storage. The results of the survey will be used to determine the extent of remediation required prior to release of these areas for unrestricted use. Characterization surveys are normally performed in such a manner that if no contamination is found, the results may be used as, or to augment final survey data.

5.2 Remediation Summary

The following is a brief summary of the anticipated remediation activities, with applicable assumptions and bases, in the remaining areas. The remediation activities are summarized in Table 5-1 below. Additional facility information, radiological information, and decommissioning plans are presented in greater detail in the document sections that follow.

Table 5-1: Planned Remediation Activities

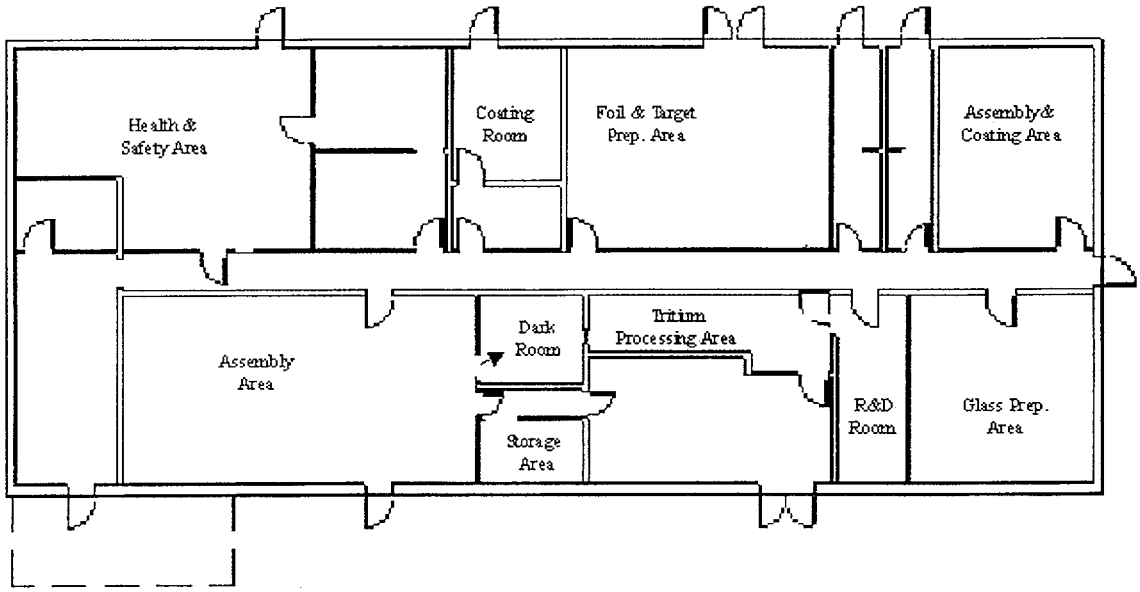
Building or Area	Remediation Activities
Nuclear Building (#12)	Remediation will include equipment removal, removal of floor tile/linoleum as needed, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods.
Machine Shop (#11)	Remediation will include equipment removal, removal of floor tile as needed, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods.The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated.
Solid Waste Building (#10)	Remediation will include equipment removal, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods.The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated.
Liquid Waste Building (#8)	Remediation will include equipment removal, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods. The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated.
Restricted Area Soils	The surface and subsurface soil inside the restricted area fence will be surveyed and any soils in excess of the DCGL limits will be excavated.

5.2.1 Nuclear Building (#12)

United States Radium Corporation erected the nuclear building (refer to Figure 5-1) in 1969 to house the tritium operations. This building was not surveyed during the 1995 characterization.

Remediation will include equipment removal, removal of floor tile/linoleum as needed, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods.

Figure 5-1, Nuclear Building



5.2.2 Machine Shop (#11)

This building was used for manufacturing and handling tritium foils and tritium luminous compounds. In 1969, these operations were moved to the nuclear building, and the building was partially decontaminated. The building is currently used as a machine shop for non-radioactive materials. Contamination may remain in overhead ventilation lines, the exhaust fan, and drains.

Remediation will include equipment removal, removal of floor tile as needed, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods. The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated. All radioactive materials will be removed from the site for disposal at a licensed radioactive waste disposal facility.

5.2.3 Solid Waste Building (#10)

Radionuclides used in this building prior to 1969 include tritium, cobalt-60, nickel-63, krypton-85, strontium-90, cesium-137, radium-226 and americium-241. The building is currently used to store and compact tritium-contaminated radioactive waste. Building exhaust is routed to the stack at the nuclear building.

Remediation will include equipment removal, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods. The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated. All radioactive materials will be removed from the site for disposal at a licensed radioactive waste disposal facility.

5.2.4 Liquid Waste Building (#8)

In the 1960s, United States Radium Corporation discontinued the practice of disposing of liquid waste in the lagoon, and constructed a holding tank and evaporator in the location of the current liquid waste building. The Susquehanna River flooded the site in 1972, destroying the holding tank and evaporator and possibly causing soil contamination. United States Radium Corporation backfilled these structures and constructed the current liquid waste building at that location. The building is currently used for dilution of low level radioactive waste water from the nuclear building. The waste water is currently transported by below-grade drain line to a concrete sump in the liquid waste building. From there, it is pumped to one of four dilution tanks within the building, each with a 2,400 gallon capacity. The diluted waste water is discharged to the river.

Remediation will include equipment removal, scabbling of contaminated concrete floor surfaces as needed, and decontamination of wall surfaces by surface cleaning or surface removal methods. The building will then be demolished. The surface and subsurface soil will be surveyed and soils in excess of the DCGL limits will be excavated. All radioactive materials will be removed from the site for disposal at a licensed radioactive waste disposal facility.

5.2.5 Restricted Area Soils

The surface and subsurface soil inside the restricted area fence will be surveyed and any soils in excess of the DCGL limits will be excavated. All radioactive materials will be removed from the site for disposal at a licensed radioactive waste disposal facility.

5.3 License Termination Surveys

License termination surveys, or final radiation surveys, will be performed in the applicable areas of the site using the guidance provided in NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (USEPA et. al, 1997). The surveys will be performed in accordance with specifically developed plans and procedures.

5.3.1 Survey Instrumentation

Selection and use of instrumentation will ensure sensitivities are sufficient to detect the identified nuclides at the minimum detection requirements. A list of typical final survey instrumentation, radiation detected, and calibration sources are provided in Table 5-2.

Table 5-2: Typical Final Survey Instrumentation

Instrument/Detector	Detector Type	Radiation Detected	Calibration Source	Use
Ludlum Model 2350/43-68	Gas-flow proportional (100 cm^2)	Alpha or beta	^{99}Tc ( ) ^{230}Th ( )	Direct measurements And smear counting
Ludlum Model 2350/44-2	NaI scintillator	Gamma	^{137}Cs	Gamma exposure rate
Ludlum Model 2350/44-40	Shielded GM (15.5 cm^2)	Beta	^{99}Tc ( )	Direct measurements
Ludlum Model 2350/43-5	ZnS scintillator	Alpha	^{230}Th ( )	Direct measurements
Tennelec Model LB5100-2080	ZnS scintillator	Alpha/Beta	^{230}Th ( ) ^{99}Tc ( )	Smear counting
Gamma Spectroscopy System	HPGe	Gamma	Mixed Gamma	Nuclide identification and quantification

6.0 REFERENCES

6-1 R.A. Means Company, Inc., 2000. *Means Building Construction Cost Data, 2000.* 58th Annual Edition.

6-2 Monserco Limited, 1994. *Characterization Plan for Safety Light Corporation Site, Bloomsburg, Pennsylvania U.S.A.*

6-3 Monserco Limited, 1996. *Characterization Survey of Safety Light Corporation Site at Bloomsburg, Pennsylvania U.S.A.*

6-4 NRC, 1982. NUREG/CR-1756, *Technology Safety and Costs of Decommissioning Reference Nuclear Research and Test Reactors.*

6-5 NRC, 1983. *NRC Policy and Guidance Directive FC 83-23, Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source, or Special Nuclear Material Licenses.*

6-6 NRC, 1990. NRC Regulatory Guide 3.66, *Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72.*

6-7 NRC, 1997. *Final Rule on Radiological Criteria for License Termination.* Federal Register: July 21, 1997 (Volume 62 Number 139).

6-8 NRC, 1998a. *Supplemental Information on the Implementation of the Final Rule on Radiological Criteria for License Termination.* Federal Register: November 18, 1998 (Volume 63, Number 222).

6-9 NRC, 1998b. Demonstrating Compliance with the Radiological Criteria for License Termination. Draft Regulatory Guide DG-4006.

6-10 NRC, 1999. *Supplemental Information on the Implementation of the Final Rule on Radiological Criteria for License Termination.* Federal Register: December 7, 1999 (Volume 64, Number 234).

6-11 NRC, 2000. *Use of Screening Values to Demonstrate Compliance with the Final Rule on Radiological Criteria for License Termination*, Federal Register: June 13, 2000 (Volume 65, Number 114).

6-12 USEPA, U.S. NRC, U.S. DOE, and U.S. DOD, 1997. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Final, NUREG-1575, EPA 402-R-97-016.

6-13 Code of Federal Regulations, *10 CFR 30, Rules of General Applicability to Domestic Licensing of Byproduct Material*

APPENDIX A- 1 Contaminated Waste Volume Summary

Table A-1
CONTAMINATED WASTE VOLUME SUMMARY
Safety Light - Tritium Facility

	Area Description	Decon* Barnwell Waste Volume (ft^3)	Barnwell Direct Bury Waste Volume (ft^3)	Generated* Envirocare Waste Volume (ft^3)	Decon* Envirocare Waste Volume (ft^3)	Envirocare Direct Bury Waste Volume (ft^3)	Total Waste Volume (ft^3)
1	Nuclear Building (#12)	0	0	66	0	2,783	2,849
2	Machine Shop (#11)	0	0	27	0	3,716	3,742
3	Solid Waste Building (#10)	0	8	18	6	3,957	3,989
4	Liquid Waste Building (#8)	0	0	54	0	23,913	23,967
5	Restricted Area Soils	0	0	11	0	2,062	2,072
		0	0	0	0		0
	TOTALS:	**0**	**8**	**176**	**6**	**36,430**	**36,620**

** Notes:*

1 Decon Waste Volume: This is the volume of waste generated directly by a decontamination process (this includes such items blasting grit, treated chemicals, etc.).

2 Generated Waste Volume: This is the volume of protective clothing waste generated by all operations on site and is a function of labor hours for each activity.

APPENDIX A- 2 Contaminated Waste Disposal Cost

Table A-2
CONTAMINATED WASTE DISPOSAL COST
Safety Light - Tritium Facility

Named Block
DISP COST

	Area Description	Decon Barnwell Disposal Cost	Barnwell Direct Bury Disposal Cost	Generated Envirocare Disposal Cost	Decon Envirocare Disposal Cost	Envirocare Direct Bury Disposal Cost	Total Waste Disposal Cost
1	Nuclear Building (#12)	$0	$0	$5,075	$0	$214,442	$219,517
2	Machine Shop (#11)	$0	$0	$2,073	$0	$286,279	$288,352
3	Solid Waste Building (#10)	$0	$3,105	$1,417	$482	$304,848	$309,851
4	Liquid Waste Building (#8)	$0	$0	$4,164	$0	$1,842,481	$1,846,645
5	Restricted Area Soils	$0	$0	$820	$0	$158,855	$159,676
	TOTALS:	**$0**	**$3,105**	**$13,549**	**$482**	**$2,806,906**	**$2,824,042**

Note: 1. Shading indicates a named field linked to another spreadsheet.
2. Direct burial & generated waste shipped to Barnwell.

WASTE DISPOSAL PACKAGING & SHIPPING COST

Named Block
SHIP COST

	Area Description	Decon Barnwell Pack & Ship Cost	Barnwell Direct Bury Pack & Ship Cost	Generated Envirocare Pack & Ship Cost	Decon Envirocare Pack & Ship Cost	Envirocare Direct Bury Pack & Ship Cost	Total Waste Pack & Ship Cost
1	Nuclear Building (#12)	$0	$0	$251	$0	$10,598	$10,849
2	Machine Shop (#11)	$0	$0	$102	$0	$14,148	$14,251
3	Solid Waste Building (#10)	$0	$9	$70	$24	$15,066	$15,169
4	Liquid Waste Building (#8)	$0	$0	$206	$0	$91,058	$91,264
5	Restricted Area Soils	$0	$0	$41	$0	$7,851	$7,891
	TOTALS:	**$0**	**$9**	**$670**	**$24**	**$138,721**	**$139,424**

*Notes:

1 Shading indicates a named field linked to another spreadsheet.

2 These are exclusive use shipments and there is a minimum cost for shipping one B-25 Box of waste to Barnwell equal to: $1,223

APPENDIX A- 3 Waste Shipping Container Cost

Table A-3
WASTE SHIPPING CONTAINER COST
Safety Light - Tritium Facility

	Area Description	Total Waste Volume (ft^3)	B-25* Waste Containers (Ea.)	Waste Container Cost ($)
1	Nuclear Building (#12)	2,849	31.7	$14,562
2	Machine Shop (#11)	3,742	41.6	$19,128
3	Solid Waste Building (#10)	3,989	44.3	$20,389
4	Liquid Waste Building (#8)	23,967	266.3	$122,497
5	Restricted Area Soils	2,072	23.0	$10,592
	TOTALS:	36,620	407	$187,220

** Notes:*
1 The number of waste containers is rounded up to next full container.

UNIT DISPOSAL COST FACTORS

Decon waste disposal rate forBarnwell :	$388.12	per cubic foot
DAW waste disposal rate for Barnwell :	$388.12	per cubic foot
DAW waste disposal rate for Envirocare :	$62.10	per cubic foot
Estimated mileage rate to Barnwell :	$1.65	per mile
Estimated transport distance to Barnwell :	670	miles
Estimated mileage rate to Envirocare :	$1.95	per mile
Estimated transport distance to Envirocare :	2,109	miles
Average direct bury waste density :	65.0	lb/cubic foot
Average generated waste density (Envirocare waste) :	25	lb/cubic foot
Truck transport waste weight limit :	44,000	pounds
Truck transport waste volume limit :	12	B-25 Boxes
B-25 box internal volume :	90	cubic feet
Estimated cost of used B-25 shipping containers :	$460.00	each
Local Industrial Waste Landfill Shipping & Disposal Rate :	$27.30	per cubic yard
Labor rate for shipping :	$44.67	per hour

APPENDIX A- 4 Waste Disposal Labor Estimate

Table A-4
WASTE DISPOSAL SUPPORT LABOR ESTIMATE
Safety Light - Tritium Facility

	Area Description	B-25 Waste Containers (Ea.)	Radioactive* Waste Shipments (Ea.)	Waste* Shipment Labor (man-hr)
1	Nuclear Building (#12)	31.7	2.6	42.3
2	Machine Shop (#11)	41.6	3.5	55.6
3	Solid Waste Building (#10)	44.3	3.7	59.2
4	Liquid Waste Building (#8)	266.3	22.2	355.9
5	Restricted Area Soils	23.0	1.9	30.8
	TOTALS:	**407.0**	**34.0**	**544.0**

** Notes:*

1 The number of waste shipments is rounded up to next full shipment.

Estimated waste loading operator time :	4 hr per load
Estimated HP Tech time per rad or mixed waste load :	4 hr per load
Estimated HP shipper time per rad or mixed waste load :	8 hr per load
Estimated clean waste shipping volume limit :	1176 ft^3 per load
Estimated radwaste shipping volume limit :	12 B-25 Boxes

WASTE DISPOSAL CASK COSTS
Safety Light - Tritium Facility

	Area Description	Liners & Cask Rental (Ea.)	Radioactive* Cask Rental Cost	Waste* Shipment Labor (man-hr)
1	Nuclear Building (#12)		0.0	0
2	Machine Shop (#11)	1	$14,400	72
3	Solid Waste Building (#10)		0.0	0
4	Liquid Waste Building (#8)		0.0	0
5	Restricted Area Soils		0.0	0
			0.0	0
	TOTALS:	**1.0**	**$14,400**	**72**

** Notes:*

1 The number of waste shipments is rounded up to next full shipment.

APPENDIX A- 5 Contaminated Waste Disposal Summary

Table A-5
CONTAMINATED WASTE DISPOSAL SUMMARY
Safety Light - Tritium Facility

LOC code	Total Waste Volume (ft^3)	B-25* Waste Containers (ea.)	CONTAINER$ Waste* Container Cost ($)	Radioactive* Waste Shipments (ea.)	SHIP LABOR Waste* Shipment Labor (man-hr)	SHIP LABOR$ Waste* Shipment Labor Cost
1	2,849	31.7	$14,562	2.6	42.3	$1,890
2	3,742	41.6	$33,528	4.5	127.6	$5,699
3	3,989	44.3	$20,389	3.7	59.2	$2,646
4	23,967	266.3	$122,497	22.2	355.9	$15,900
5	2,072	23.0	$10,592	1.9	30.8	$1,375
Total	**36,620**	**407.0**	**$201,568**	**35.0**	**615.8**	**$27,510**

** Notes:*

1 The number of waste containers are rounded up to next full container.
2 The number of waste shipments are rounded up to next full shipment.

APPENDIX A- 6 Building Area Survey Cost Estimate

IMPACTED BUILDING AREA SURVEY

Table A-6

Safety Light - Tritium Facility

ENTER BELOW OPTNL LOC CODE	ENTER BUILDING NAME BELOW	ENTER ROOM NUMBER BELOW	ENTER AREA DESCRIPTION BELOW	SURVEY PACKAGE REQRD ? (Y/N)	ENTER AREA WIDTH BELOW (ft)	ENTER AREA LENGTH BELOW (ft)	ENTER AREA HEIGHT BELOW (ft)	ENTER FLOOR + L. WALL SURVEY CODE	ENTER U. WALL + CEILING SURVEY CODE	ENTER Survey Sketchs (each)	SURVEY PACKAGE PREP (hrs)	DIRECT SURVEY LABOR (hrs)
1	Nuclear Building (#12)	Exterior	Exterior	Y	120.0	50.0	10.0	1	5	1	4	124
2	Machine Shop (#11)	Exterior	Exterior	Y	20.0	30.0	10.0	1	5	1	4	29
3	Solid Waste Building (#10)	Exterior	Exterior	Y	20.0	20.0	10.0	1	5	1	4	25
4	Liquid Waste Building (#8)	Exterior	Exterior	Y	20.0	60.0	10.0	1	5	1	4	42
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
		Exterior	Exterior									
1	Nuclear Building (#12)	1	Glass Prep Area	Y	21.0	22.0	10.0	1	4	1	4	22
1	Nuclear Building (#12)	2	R & D Room	N	8.0	22.0	10.0	1	4	1		13
1	Nuclear Building (#12)	3	Tritium Processing Area	N	15.0	16.0	10.0	1	4	1		14
1	Nuclear Building (#12)	4	Room North of Tritium Proc. Area	N	19.0	20.0	10.0	1	4	1		17
1	Nuclear Building (#12)	5	Dark Room	N	12.0	11.0	10.0	1	4	1		11
1	Nuclear Building (#12)	6	Hall Between Dark Room & Storage	N	12.0	3.0	10.0	1	4	1		9
1	Nuclear Building (#12)	7	Storage Area	N	12.0	7.0	10.0	1	4	1		10
1	Nuclear Building (#12)	8	Assembly Area	N	38.0	22.0	10.0	1	4	1		25
1	Nuclear Building (#12)	9	Lunch Room	N	11.0	26.0	10.0	1	4	1		15
1	Nuclear Building (#12)	10	Central Hall	N	108.0	4.0	10.0	1	4	1		29
1	Nuclear Building (#12)	11	Ladies' Room A	N	11.0	8.0	10.0	1	4	1		10
1	Nuclear Building (#12)	12	Health and Safety Area	N	24.0	25.0	10.0	1	4	1		21
1	Nuclear Building (#12)	13	Administrative Office	N	15.0	10.0	10.0	1	4	1		12
1	Nuclear Building (#12)	14	Production Manager's Office	N	15.0	11.0	10.0	1	4	1		12
1	Nuclear Building (#12)	15	Coating Room Entry	N	12.0	7.0	10.0	1	4	1		10
1	Nuclear Building (#12)	16	Coating Room	N	12.0	14.0	10.0	1	4	1		12
1	Nuclear Building (#12)	17	Foil & Target Prep/Misc. Work Area	N	29.0	22.0	10.0	1	4	1		22
1	Nuclear Building (#12)	18	Men's Room	Y	5.0	22.0	10.0	1	4	1	4	16
1	Nuclear Building (#12)	19	Ladies' Room B	N	5.0	22.0	10.0	1	4	1		12
1	Nuclear Building (#12)	20	Assembly & Coating Area	N	17.0	22.0	10.0	1	4	1		17
2	Machine Shop (#11)			N	20.0	30.0	10.0	1	4	1		21
3	Solid Waste Building (#10)			N	20.0	20.0	10.0	1	4	1		17
4	Liquid Waste Building (#8)			N	20.0	60.0	10.0	1	4	1		33
			TOTALS								24	600

APPENDIX A- 7 Outdoor Area Survey Labor Summary

IMPACTED UNPAVED OPEN LAND AREA SURVEY

Table A-7

Safety Light - Tritium Facility

ENTER BELOW OPTIONAL LOC CODE	ENTER SURFACE TYPES BELOW	ENTER AREA DESCRIPTION BELOW	SURVEY PACKAGE REQRD ? (Y/N)	ENTER AREA WIDTH BELOW (ft)	ENTER AREA LENGTH BELOW (ft)	SUB SURFACE ACTIVITY DEPTH (ft)	10-meter SURVEY BLOCKS	ENTER Random Survey Sketchs (each)	Survey Sketch Hours	SURVEY PACKAGE PREP (hrs)	DIRECT SURVEY LABOR (hrs)
5	Grass	Restricted Area Soils	Y	264	330	1	99	1	0.3	4	283
					TOTALS:		99		0	4	283

IMPACTED PAVED OUTDOOR AREA SURVEY

Table A-7

Safety Light - Tritium Facility

ENTER BELOW OPTIONAL LOC CODE	ENTER SURFACE TYPES BELOW	ENTER AREA DESCRIPTION BELOW	SURVEY PACKAGE REQRD ? (Y/N)	ENTER AREA WIDTH BELOW (ft)	ENTER AREA LENGTH BELOW (ft)	SCANS	GAMMA SURVEY POINTS	ENTER Random Survey Sketchs (each)	Survey Sketch Hours	SURVEY PACKAGE PREP (hrs)	DIRECT SURVEY LABOR (hrs)
5	Cement	Slab north of Nuclear Building	Y	24	10	100	30	1	0.3	4	7
5	Cement	Sidewalk around Nuclear Building	N	3	262	800	32	1	0.3		17
								1	0.3		0
								1	0.3		0
								1	0.3		0
								1	0.3		0
								1	0.3		0
								1	0.3		0
		TOTALS				900	62		3	4	26

APPENDIX A- 8 Instrument Lease Charges

Table A-8

COMMERCIAL CLIENT INSTRUMENT COSTS

Safety Light - Tritium Facility

3 D&D Months Duration
1.0 Final Survey Months Duration
0.5 Characterization Survey Months Duration

ITEM NO.	INSTRUMENT DESCRIPTION	MONTHLY COMMERCIAL RENTAL RATE	CHAR SRVY NO. INSTS REQUIRED	D&D NO. INSTS REQUIRED	FINAL SRVY NO. INSTS REQUIRED	D&D FULL PROJECT DURATION	D&D ALT. MONTHLY DURATION	CHAR SRVY INST LEASE COST	D&D INST LEASE COST	FINAL SRVY INST LEASE COST
	RADIATION PROTECTION AND MEASUREMENT INSTRUMENTATION/SYSTEMS									
1	Becton Dickson - TRITON, Model III Tritium Monitor :	$1,758		1		Y			$5,274	
2	MICROSPEC-2, NaI(Tl) Gamma Spec System W/Detector, PC, Software, Case & Accessories :	$1,877								
3	GENI PC, Gamma Spec System W/Detector, PC, Software, Case & Accessories Model 4610J / GC4519 :	$3,646		1	1	Y			$10,938	$3,646
4	INSPECTOR, Portable Gamma Spec W/Detector, PC, Software, M-1 Insitu Cal, Tripod & Accessories :	$2,821								
5	O² Low Level Waste Assay System W/(3) HPGe Detectors, PC, Vault Shield W/Scale, Turntable & Acc.:	$9,846								
6	GTSD Mod. O² Waste Assay System W/(3) HPGe Detectors, PC, Modular Shield W/Scale, Turntable & Acc.:	$5,934								
7	DCA - Portable Area Monitor 3090-3 :	$168								
8	Eberline -FASTRACK II Dosimetry System With PC, Printer, 1ea DR200, 1ea DR200R, 30ea DD100 & Software :	$1,691								
9	Eberline - Dosimeter Meter Reader Model DR-200 :	$257								
10	Eberline - Dosimeter Response Check Station Model DR-200 OPT7 :	$420								
11	Eberline - FASTRAC II, PC Dose Management Program with PC Utility :	$327								
12	Eberline - Dosimeter Model DD-300 :	$65								
13	Eberline - Personal Contamination Monitor, Model PCM-1B w/ Accessories :	$2,727								
14	Eberline - Personal Contamination Monitor, Model PCM-1C w/ Accessories :	$3,203								
15	Eberline - Personal Contamination Monitor, Model PCM-2 Base Unit :	$4,005								
16	Eberline - Portable Alpha Counter, Model SAC-4 :	$701								
17	Eberline- Portable Beta Counter, Model BC-4 :	$528								
18	Eberline - Portable GM Survey Instrument, Model E-520 w/ HP-270 & SK-1 :	$246								
19	Eberline - Portable GM Survey Instrument, Model E-520 W/ HP-260 & SK-1 :	$260								
20	Eberline - Portable High Range Ion Chamber, Model R07 W/Low & Mid-Range Detectors, 5' Extension & 60' Cable :	$657								
21	Eberline - Portable Ion Chamber Instrument, Model R02 :	$196								
22	Eberline - Portable Ion Chamber Instrument, Model R02A :	$217								
23	Eberline - Scintillation Portal Monitor, Model PM-7 W/PC, Software, Calibration Jig, Remote ALarm & 60' Cable :	$2,531								
24	Eberline - Tool Contamination Monitor, Model TCM-2 with Spare Detector :	$3,208								
25	Eberline - TELETECTOR Gamma Dose Rate Meter, Model 6112B w/ Accessories :	$720								
26	EG&G - NOMAD, Portable PC Based Gamma Spec Analyzer W/HPGe Detector, PC, Software & Acc. :	$2,048								
27	EG&G - 30 Liter Dewar, Vertical Cryostat and Lead Shield for NOMAD :	$366		1	1	Y			$1,098	$366
28	F&J - BUCK Pump Kit, 5 Personal Air Samplers, Calibrator, Charger & Case :	$867								
29	F&J - Model HV-1, High Volume Air Sampler with Sample Head :	$151		1		Y			$453	
30	F&J - MODEL LV-1, Low Volume Air Sampler with Sample Head :	$141		2		Y			$846	
31	F&J - MODEL LV-14M, GOOSENECK LOW VOLUME AIR SAMPLER WITH SAMPLE HEAD :	$270								
32	LUDLUM - MODEL 12 SURVEY METER WITH 44-9 PANCAKE GM PROBE & CASE:	$138		2		Y			$828	
33	LUDLUM - MODEL 12 SURVEY METER WITH 43-5 ALPHA SCINTILLATION PROBE & CASE:	$184								
34	LUDLUM - MODEL 19 MICRO R METER WITH HARD CASE:	$185		1	1	Y			$555	$185
35	LUDLUM - MODEL 177 ALARM RATE METER WITH 44-9 PROBE AND CASE :	$172								
36	Ludlum - Model 239-1F Floor Monitor Cart W/O Model 12 Meter & W/Model 43-37 425 cm² Gas Flow Detector:	$415			1					$415
37	Ludlum - Model 2350 Data Logger Kit, W/Keypad, Barcode Reader, Pelican Case & Detectors # 38 Thru 43 Below :	$1,561		2	2	Y			$9,366	$3,122
38	Ludlum - Model 2350 Data Logger Kit, W/Keypad, Barcode Reader, Pelican Case (No Detectors) :	$393								
39	LUDLUM - MODEL 43-5 ALPHA SCINTILLATION DETECTOR :	$80								
40	LUDLUM - MODEL 43-68 100 cm2 GAS PROPORTIONAL DETECTOR :	$71								
41	LUDLUM - MODEL 44-1 BETA SCINTILLATION DETECTOR	$73								
42	LUDLUM - MODEL 44-2 HIGH ENERGY GAMMA SCINTILLATION DETECTOR :	$73								
43	LUDLUM - MODEL 44-38 ENERGY COMPENSATED GM DETECTOR :	$26								
44	LUDLUM - MODEL 44-40 SHIELDED GM PANCAKE DETECTOR :	$55								
45	LUDLUM - BETA AIR MONITOR (CAM), MODEL 333-2 :	$807								
46	LUDLUM - MODEL 77-3 STRETCH SCOPE (TELETECTOR):	$509								
47	NE TECHNOLOGY - MODEL CM7A CONTAMINATION MONITOR WITH DP5HA PROBE :	$793								
48	Packard - PC Based Liquid Scintillation Counter W/ Alpha / Beta Option & Accessories / A2550P2 :	$2,668								
49	Quantrad - SCOUT-1, NaI(Tl) Gamma Spec System W/Detector, PC, Software, Case & Accessories :	$1,560								
50	REUTER-STOKES - PRESSURIZED ION CHAMBER RSS-122 :	$1,056								
51	TENNELC - MODEL LB 5100-2080-III PC BASED ALPHA/BETA COUNTER SYSTEM :	$2,011								
	RADIATION PROTECTION AND MEASUREMENT INSTRUMENTATION/SYSTEMS									
52	TSI - MODEL 8020 PORTACOUNT, RESPIRATOR FIT TESTER :	$1,404								
53	XETEX - MODEL 330A TELESCAN DOSE RATE METER W/ CASE & ACCESSORIES :	$682								
	INSTRUMENTATION SOURCES (MAY BE CHARGED AS CONSUMABLE OR RENTAL)									
54	GAMMA SPEC. NIST TRACEABLE MIXED SOIL EQUIVALENT 1 LITER MARINELLI :	$205		1	1	Y			$615	$205
55	GAMMA SPEC. NIST TRACEABLE MIXED WATER EQUIVALENT 1 LITER MARINELLI :	$205		1	1	Y			$615	$205
56	GAMMA SPEC. NIST TRACEABLE MIXED FILTER PAPER EQUIVALENT :	$185								
57	GAMMA SPEC. NIST TRACEABLE MIXED POINT SOURCE :	$185								
58	Q2 GAMMA SPEC. NIST TRACEABLE MIXED 30 INCH LINE SOURCE :	$218								
59	Q2 GAMMA SPEC. NIST TRACEABLE MIXED 6 INCH QC SOURCE :	$158								
60	ALPHA/BETA COUNTER BC-4, NIST Tc-99 47mm LINEARITY 4 SOURCE SET :	$252								
61	NIST Tc-99 47mm SOURCE PER EACH (1, 10, 100 OR 1000 nCi) :	$74		4	4	Y			$888	$296
62	ALPHA/BETA COUNTER SAC-4, NIST Th-230 47mm LINEARITY 4 SOURCE SET :	$303								
63	NIST Th-230 47mm SOURCE PER EACH (1, 10, 100 OR 1000 nCi) :	$89		1	1	Y			$267	$89
64	CM7A NIST ALPHA CAL/CHECK SOURCE WITH ALUMINUM CASE/HOLDER :	$229								
65	CM7A NIST BETA CAL/CHECK SOURCE WITH ALUMINUM CASE/HOLDER :	$209								
66	TCM-2 & PCM -1B, NIST CAL/CHECK SOURCE :	$358								
67	PM -7, NIST CAL/CHECK SOURCE :	$202								
	DECON EQUIPMENT									
68	LTC VAC-U-BLAST STEEL SHOT BLASTER :	$11,970								
69	PENTEK VAC-PAC MODEL 9A VACUUM :	$4,481		1			2		$8,962	
70	PENTEK SQUIRREL III FLOOR SCABBLER :	$1,931								
71	PENTEK CORNER CUTTER NEEDLE GUN :	$566								
72	MCDONALD AIR TOOL MODEL U-5, 5 PISTON FLOOR SCABBLER :	$1,157		1		Y			$3,471	
73	MCDONALD AIR TOOL MODEL 3WCW, 3 PISTON WALL SCABBLER :	$492		1		Y			$1,476	
74	MCDONALD AIR TOOL MODEL HS, SINGLE PISTON SCABBLER :	$104								
75	2000 CFM HEPA VENTILATION UNIT MODEL 1990C :	$232								
76	HAKO TWIN HEAD ELECTRIC HEPA VACUUM :	$339								
77	NORCLEAN TRIPLE HEAD ELECTRIC HEPA VACUUM :	$948		1		Y			$2,844	
	M&TE/TEST EQUIPMENT									
78	FLUKE - 8060A DVM WITH HV PROBE, CASE AND LEADS :	$139								
79	EBERLINE - MP-2 MINIPULSER AND LUDLUM MODEL 500 MINIPULSER :	$411								
80	TEKTRONIX - MODEL 2225, 100 MHZ PORTABLE OSCILLOSCOPE WITH BATTERY PACK :	$490								
81	F&J AIR FLOW CALIBRATOR MODEL D-812 :	$191								
82	F&J AIR FLOW CALIBRATOR MODEL D-814 :	$191								
83	FIELD SERVICE TOOL KIT :	$124								
	OFFICE EQUIPMENT									
84	DATA ANALYSIS COMPUTER SYSTEM :	$195		1	1	Y			$585	$195
85	DOWNLOAD NOTEBOOK COMPUTERS :	$144		1	1	Y			$432	$144
86	HP MODEL IIIP LASER JET PRINTER :	$79		1	1	Y			$237	$79
87	HP MODEL 4L LASER JET PRINTER :	$79								
88	HP OFFICE JET FAX/COPIER :	$59								
	SAMPLING EQUIPMENT									
89	BICO - JAW CRUSHER, MODEL 241-36X35 :	$284								
90	FISHER SCIENTIFIC -TOP LOADING SCALE, 0-3 kg MODEL XE4100 :	$183		1	1	Y			$549	$183
91	FISHER SCIENTIFIC - CLASS F S.S. WEIGHT SET, 1mg-2kg CAT.# 0221531 :	$43		1	1	Y			$129	$43
92	FISHER SCIENTIFIC - OVEN, ISOTEMP 5.0 120VAC CAT.# 13247750G :	$296		1	1	Y			$888	$296
93	FORESTRY SUPPLIERS - SOIL SAMPLING AUGER KIT, CAT.# 67352 :	$276								
	GLOBAL POSITIONING SYSTEM									
94	TRIMBLE NAVIGATION - SITE SURVEYOR SYSTEM, MODEL 4000SE :	$5,906								
	COMMUNICATIONS EQUIPMENT									
95	MOTOROLA - MODEL HT1000, 16 CHANNEL UHF RADIO WITH ACCESSORIES :	$203								
							TOTAL INSTRUMENT LEASE COST		$51,316	$9,469

APPENDIX A- 9 Equipment Lease Charges

Table A-9

COMMERCIAL CLIENT EQUIPMENT COSTS
Safety Light - Tritium Facility

3 D&D Months Duration
1 FINAL SURVEY Months Duration

ITEM NO.	EQUIPMENT DESCRIPTION	MONTHLY COMMERCIAL RENTAL RATE	D&D NUMBER ITEMS REQUIRED	FINAL SRV NUMBER ITEMS REQUIRED	D&D FULL PROJECT DURATION	D&D ALT. MONTHLY DURATION	D&D EQUIP. LEASE COST	FINAL SRV EQUIP. LEASE COST
	DECON EQUIPMENT							
1	LTC VAC-U-BLAST Steel Shot Blaster :	$11,970						
2	PENTEK VAC-PAC Model 9A Vacuum :	$4,481						
3	PENTEK SQUIRREL III Floor Scabbler :	$1,931						
4	PENTEK CORNER CUTTER Needle Gun :	$566						
5	MCDONALD AIR TOOL Model U-5, 5 Piston Floor Scabbler :	$1,157						
6	MCDONALD AIR TOOL Model 3WCW, 3 Piston Wall Scabbler :	$492						
7	MCDONALD AIR TOOL Model HS, Single Piston Scabbler :	$104						
8	2000 CFM HEPA Ventillation Unit Model 1990C :	$232						
9	HAKO Twin Head Electric HEPA Vacuum :	$339						
10	NORCLEAN Triple Head Electric HEPA Vacuum :	$948						
	OFFICE EQUIPMENT							
11	Data Analysis Computer System :	$195						
12	Download Notebook Computers :	$144						
13	HP Model IIIP Laser Jet Printer :	$79						
14	HP Model 4L Laser Jet Printer :	$79						
15	HP Office Jet FAX/Copier :	$59						
16	35mm Camera	$64	1	1	N	2	$128	$64
17	Fax machine	$23						
18	Telephone	$5						
19	Office Trailer, 50' x 10'	$786						
20	Toilet, portable chemical	$210						
21	Desk	$129						
22	File Cabinet, 5 drawer x 28"	$123						
23	File Cabinet, fireproof, 4 drawer	$364						
24	Work Tables, 30" x 60"	$49						
25	Coat Racks, 36" x 21" x 60"	$87						
26	Draft Table	$227						
27	Desk Chairs	$54						
28	Molded Plastic Chairs	$13						
29	Microwave oven	$93						
30	Coffee Machine	$142						
31	Refrigerator	$326						
32	Waste Containers (7 gallon)	$11						
33	Waste Containers (35 gallon)	$51						
34	Draft Table Stool	$55						
35	Plan Holders (P&ID)	$87						
36	Break Room Folding Tables	$96						
37	Molded Plastic Chairs	$13						
38	Multi-Media Board, 36" x 60"	$33						
	SAMPLING EQUIPMENT							
39	BICO - Jaw Crusher, Model 241-36X35 :	$284						
40	FISHER SCIENTIFIC -Top Loading Scale, 0-3 kg Model XE4100 :	$183						
41	FISHER SCIENTIFIC - Class F S.S. Weight Set, 1mg-2kg CAT.# 0221531 :	$43						
42	FISHER SCIENTIFIC - Oven, ISOTEMP 5.0 120VAC CAT.# 13247750G :	$296						
43	FORESTRY SUPPLIERS - Soil Sampling Auger Kit, CAT.# 67352 :	$276						
	COMMUNICATIONS EQUIPMENT							
44	MOTOROLA - Model HT1000, 16 Channel UHF Radio with Accessories :	$203						
	TOOLS							
45	Full Set Misc Tools w/Chest	$89						
46	3/4" Impact Wrench	$122						
47	3/4" Impact Socket Set	$22						
48	Set of Lifting Slings	$54	1		Y		$162	
49	Drum Heaters - Evaporation	$27						
50	8' Fiberglass Step Ladder	$43	1	1	Y		$129	$43
51	4 Outlet GFCI Circuit Guard	$59						
52	Air Compressor (2-1/2 HP, 5.5 CFM)	$71						
53	1" x 150' Air Hose	$27	2		Y		$162	
54	Air Chipping Hammer with Chisels	$92						
55	Electric Drills 1/2 Inch	$44						
56	8-1/4" Circular Saw	$34						
57	Milwaukee Heavy Duty Straight Grinder	$86						
58	Long Handled Shovels	$9						
59	Snow Shovels	$4						
60	Steel Pry Bar	$2						
61	Long Handeled Pry Bar Set	$14						
62	Electric Paint Sprayer (for fixative agents)	$20						
63	Cutting Torch	$104	1		Y		$312	
64	Band Saw	$55	2		Y		$330	
65	Drum handling cart	$34						
66	Extension cord, 100 ft, 12/3, 15A	$31						
67	Lighting standard, 2 500 W halogen quartz	$35	1		Y		$105	
68	String light, 100 ft, 10 lamp	$10						
69	110,000 BTU Oil-Fired Space Heater	$57						
	HEAVY EQUIPMENT RENTAL							
70	Truck Mounted Hydraulic Crane, 25 Ton	$6,210	1		N	1	$6,210	
71	40' Telescoping Boom Lift	$3,968	1	1	N	2	$7,936	$3,968
72	Truck, Three axle dump, 16 ton payload	$4,715						
73	Oxyacetylene Cutting Outfits	$224	1		Y		$672	
74	1-1/4 C.Y. Backhoe Loader	$3,278	1		N	1	$3,278	
75	Backhoe Attachment, 1000 ft-lb Hydraulic Hammer	$3,565	1		N	2	$7,130	
76	Hydraulic Grapple with Shear Attachment for Loader	$1,087						
77	Service Truck	$949	1		Y		$2,847	
	SAFETY EQUIPMENT							
78	Respirators	$43						
79	Tripod Lifeline Rescue System	$183	1	1	Y		$549	$183
80	Portable Axial Electric Blower W/25' Ducting	$159	1		Y		$477	
81	Confined Space Safety Harness	$24	1	1	Y		$72	$24
82	Portable Multigas Monitor	$166	1	1	Y		$498	$166
83	First Aid Kit	$24	1	1	Y		$72	$24
84	Respirator Porta Count	$468						
85	Heat Stress Monitor	$82						
					TOTAL EQUIPMENT LEASE COST		$31,069	$4,472

APPENDIX A- 10 Demolition Estimate

Table A-10
Demolition Estimate
Safety Light - Tritium Facility

LABOR BASED DEMOLITION COSTS: Labor by man-hour

Management, Supervision, & HP Support Labor Not Included

LOC CODE	WBS No.	AREA	Util Operator & Craftsmen $41.42	Laborers $38.00	Craftsman $41.42	HP Tech $50.08	DEMOLITION LABOR hours	TOTAL PRICE
1		General Cleanup of Nuclear Building (#12)		240.00			240.0	$9,119
2		General Cleanup of Machine Shop (#11)		24.00			24.0	$912
3		General Cleanup of Solid Waste Building (#10)		16.00			16.0	$608
4		General Cleanup of Liquid Waste Building (#8)		48.00			48.0	$1,824
5		General Cleanup of Outdoor Areas		16.00			16.0	$608
3		Clean Out Contents of Waste Tanks		24.00			24.0	$912
								$0
								$0
								$0
								$0
								$0
							368.0	$13,983

TASK BASED DEMOLITON COSTS

42% Hazardous & Toxic Waste Productivity Factor: Level C, Heavy Work, 70 - 85°F

Percent Labor Cost 65.00%
Average Hourly Labor Rate $38.00

LOC CODE	WBS No.	AREA	QUANTITY	UNIT	MATERIAL UNIT PRICE	LABOR UNIT PRICE	EQUIPMENT UNIT PRICE	MATERIAL TOTAL PRICE	LABOR TOTAL PRICE	EQUIPMENT TOTAL PRICE	TOTAL PRICE
2		Machine Shop Demolition	6,000	CF		$0.11	$0.11		$1,628	$1,571	$3,200
2		Machine Shop Slab Demolition	600	SF		$5.05	$0.60		$7,219	$857	$8,076
2		Machine Shop Soil Removal - 6" deep, no buffer	11.11	CY		$4.07	$1.35		$108	$36	$143
2		Machine Shop Equipment Removal	24	TON		$675.49	$0.00		$39,341	$0	$39,341
3		Solid Waste Building Demolition	4,000	CF		$0.11	$0.11		$1,086	$1,048	$146,135
3		Solid Waste Building Slab Demolition	400	SF		$4.07	$0.60		$3,872	$571	$4,443
3		Solid Waste Building Soil Removal - 6" deep, no buffer	7	CY		$4.07	$1.35		$72	$24	$96
3		Solid Waste Building Equipment Removal	16	TON		$675.49	$0.00		$26,227	$0	$26,227
4		Liquid Waste Building Demolition	12,000	CF		$0.11	$0.10		$3,257	$2,857	$6,114
4		Liquid Waste Building Slab Demolition	1,200	SF		$4.07	$0.60		$11,616	$1,714	$13,330
4		Liquid Waste Building Soil Removal - 10' deep, no buffer	444	CY		$4.07	$1.35		$4,302	$1,429	$5,731
4		Liquid Waste Building Equipment Removal	49	TON		$675.49	$0.00		$78,681	$0	$78,681
4		Liquid Waste Building Sump Removal	512	CF		$0.11	$0.11		$139	$134	$273
5		Excavate Buried Drain Pipe	59	CY		$3.04	$1.37		$429	$193	$622
5		Remove Buried Drain Pipe, 12"	400	LF		$5.21	$1.16		$4,958	$1,105	$6,062
5		Remove Imbedded Drain Pipe	50	LF	$4.29	$0.00	$2.02	$511	$0	$240	$751
5		Excavate Buried Sewer Pipe	15	CY		$3.04	$1.37		$107	$48	$156
1		Remove Buried Sewer Pipe	100	LF		$5.21	$1.16		$1,239	$276	$1,516
1		Remove Imbedded Sewer Pipe	100	LF	$4.29	$0.00	$2.02	$1,021	$0	$481	$1,502
5		Remove manholes/Catch Basins	2	EA		$227.98	$51.00		$1,086	$243	$1,328
5		Backfill All Soil Excavations	660	CY	$4.77	$0.87	$1.35	$7,493	$1,373	$2,121	$10,986
1		Nuclear Building Equipment Removal	61	TON		$675.49	$0.00		$98,352	$0	$98,352
								$9,024.7	$285,090.7	$14,948.6	$453,066

APPENDIX A- 11 Decontamination Costs

Table A-11
DECONTAMINATION COSTS
Safety Light - Tritium Facility

SPECIFIC AREA SURFACE REMOVAL COST ANALYSES WITH BARNWELL DISPOSAL

INPUT APP. CODE	METHODOLOGY	INPUT AREA	INPUT ITEM	INPUT LOC CODE	INPUT WBS No.	INPUT SURFACE AREA (ft^2)	INPUT MATERIAL THICK (in)	TOTAL VOLUME (ft^3)	INPUT CONTAM. REMOVAL DEPTH (in)	INPUT CONTAM. WASTE DENSITY (lb/ft^3)	CONTAM. VOLUME (ft^3)	CONTAM. WEIGHT (lbs)	**PROCESS COST PLUS ** **BARNWELL WASTE DISPOSAL COST** BURIAL SHIP & BURY ($)	PROCESS COST ($/ft^2)	PROCESS COST ($)	SURFACE RELEASE COST ($)	COST GRAND TOTAL ($)

SPECIFIC AREA SURFACE REMOVAL COST ANALYSES WITH ENVIROCARE DISPOSAL

INPUT APP. CODE	METHODOLOGY	INPUT AREA	INPUT ITEM	INPUT LOC CODE	INPUT WBS No.	INPUT SURFACE AREA (ft^2)	INPUT MATERIAL THICK (in)	TOTAL VOLUME (ft^3)	INPUT CONTAM. REMOVAL DEPTH (in)	INPUT CONTAM. WASTE DENSITY (lb/ft^3)	CONTAM. VOLUME (ft^3)	CONTAM. WEIGHT (lbs)	**PROCESS COST PLUS ** **ENVIROCARE WASTE DISPOSAL COST** BURIAL SHIP & BURY ($)	PROCESS COST ($/ft^2)	PROCESS COST ($)	SURFACE RELEASE COST ($)	COST GRAND TOTAL ($)
1	McDonald U-5 Scabbler-1/4"	Solid Waste Building (#10)	25% Floor	3		100	12		0.250	66.7	3.1	208	$266	$0.691	$69	$52	$387
3	McDonald 3WCD Scabbler-1/8"	Solid Waste Building (#10)	25% Walls	3		200	12		0.125	66.7	3.1	208	$266	$3.026	$605	$104	$975
1	McDonald U-5 Scabbler-1/4"	Liquid Waste Building (#8)	0% Floor	4		0	12		0.250	66.7				$0.691			
3	McDonald 3WCD Scabbler-1/8"	Liquid Waste Building (#8)	0% Walls	4		0	12		0.125	66.7				$3.026			
1	McDonald U-5 Scabbler-1/4"	Machine Shop (#11)	0% Floor	2		0	12		0.250	66.7				$0.691			
3	McDonald 3WCD Scabbler-1/8"	Machine Shop (#11)	0% Walls	2		0	12		0.125	66.7				$3.026			
1	McDonald U-5 Scabbler-1/4"	Nuclear Building (#12)	0% Floor	1		0	12		0.250	66.7				$0.691			
3	McDonald 3WCD Scabbler-1/8"	Nuclear Building (#12)	0% Walls	1		0	12		0.125	66.7				$3.026			
								TOTAL:			6.3	417	$533			$156	$1,363

SPECIFIC AREA SURFACE CLEANING COST ANALYSES WITH BARNWELL DISPOSAL

INPUT APP. CODE	METHODOLOGY	INPUT AREA	INPUT ITEM	INPUT LOC CODE	INPUT WBS No.	0.0929 INPUT SURFACE AREA (ft^2)	INPUT ORIGINAL CONTAM. VOLUME (ft^3)	INPUT ORIGINAL CONTAM. WEIGHT (lb)	ft³ per m³ GENERATED RW VOLUME (ft^3)	GENERATED WASTE DENSITY (lb/ft^3)	GENERATED WASTE WEIGHT (lb)	** PROCESSED RADWASTE DISPOSAL ** BURIAL SHIP & BURY ($)	PROCESS COST ($/ft^2)	PROCESS COST ($)	SURFACE RELEASE COST ($)	COST GRAND TOTAL ($)	BARNWELL RATE ($/ft^3)
																	$0.00
																	$0.00
																	$0.00
																	$0.00

SPECIFIC AREA SURFACE CLEANING COST ANALYSES WITH ENVIROCARE DISPOSAL

INPUT APP. CODE	METHODOLOGY	INPUT AREA	INPUT ITEM	INPUT LOC CODE	INPUT WBS No.	0.0929 INPUT SURFACE AREA (ft^2)	INPUT CONTAM. VOLUME (ft^3)	INPUT ORIGINAL CONTAM. WEIGHT (lb)	ft³ per m³ GENERATED RW VOLUME (ft^3)	GENERATED WASTE DENSITY (lb/ft^3)	GENERATED WASTE WEIGHT (lb)	** PROCESSED RADWASTE DISPOSAL ** BURIAL SHIP & BURY ($)	PROCESS COST ($/ft^2)	PROCESS COST ($)	SURFACE RELEASE COST ($)	COST GRAND TOTAL ($)	ENVIROCARE RATE ($/ft^3)
													$0.00				
													$0.00				
													$0.00				
					SUB TOTAL:		0	0	0.0		0.0	$0		$0	$0	$0	

APPENDIX A- 12 Soil Waste Volume

Appendix A-12
SOIL WASTE VOLUME ESTIMATES
Safety Light - Tritium Facility

Soil Rad Waste Estimate

Excavated Soil Density 80 (lbs/ft^3)
Original Soil Density 114 (lbs/ft^3)

LOC CODE	WBS No.	AREA	WIDTH (ft)	LENGTH (ft)	DEPTH (in)	WEIGHT (lbs)	VOLUME (ft^3)	CONTAMINATED FRACTION
2		Soil Under Demolished Machine Shop	20	30	6	34,200	428	1.00
3		Soil Under Demolished Solid Waste Bldg.	20	20	6	22,800	285	1.00
4		Soil Under Demolished Liquid Waste Bldg.	20	60	120	1,368,000	17,100	1.00
		RAD WASTE SUBTOTAL:				**1,425,000**	**17,813**	

APPENDIX A- 13 Miscellaneous Item Inventory Estimate

Table A-13

MISCELLANEOUS ITEM VOLUME ESTIMATES

Safety Light - Tritium Facility

DESCRIPTION	LOC CODE	WBS No.	UNITS	NUMBER OF UNITS	MATERIAL OF CONSTRUCT.	BULK DENSITY (lb/ft^3)	UNIT WEIGHT (lb)	UNIT VOLUME (ft^3)	TOTAL WEIGHT (lb)	TOTAL VOLUME (ft^3)	PERCENT DIRECT BURY (vol %)	ENVIRO DISPOSAL WEIGHT (lb)	BARNWELL DISPOSAL WEIGHT (lb)	BARNWELL DISPOSAL VOLUME (ft^3)	ENVIRO DISPOSAL VOLUME (ft^3)
Nuclear Building Equipment Removal	1		CF	1,920	Misc	63.7		1.0	122,304	1,920	100%	122,304	0	0	1,920
Machine Shop Demolition	2		CF	2,220	Misc	34.5		1.0	76,590	2,220	100%	76,590	0	0	2,220
Machine Shop Slab	2		CF	300	Concrete	100.0		1.0	30,000	300	100%	30,000	0	0	300
Machine Shop Equipment Removal	2		CF	768	Misc	63.7		1.0	48,922	768	100%	48,922	0	0	768
Solid Waste Building Demolition	3		CF	1,480	Misc	34.5		1.0	51,060	1,480	100%	51,060	0	0	1,480
Solid Waste Building Slab	3		CF	200	Concrete	100.0		1.0	20,000	200	100%	20,000	0	0	200
Liquid Waste Building Demolition	4		CF	4,440	Misc	34.5		1.0	153,180	4,440	100%	153,180	0	0	4,440
Liquid Waste Building Slab Demolition	4		CF	600	Concrete	100.0		1.0	60,000	600	100%	60,000	0	0	600
Liquid Waste Building Equipment Removal	4		CF	1,536	Misc	63.7		1.0	97,843	1,536	100%	97,843	0	0	1,536
Liquid Waste Building Sump Removal	4		CF	237	Misc	34.5		1.0	8,170	237	100%	8,170	0	0	237
Removed Buried Drain Pipe	5		CF	1,600	Misc	75.0		1.0	120,000	1,600	100%	120,000	0	0	1,600
Removed Imbedded Drain Pipe	5		LF	400	Steel	68.9	53.6	0.8	21,424	311	100%	21,424	0	0	311
Removed Buried Sewer Pipe	1		CF	400	Misc	75.0		1.0	30,000	400	100%	30,000	0	0	400
Removed Imbedded Sewer Pipe	1		LF	100	Steel	94.6	19.0	0.2	1,897	20	100%	1,897	0	0	20
Removed Manholes and Catch Basins	5		ea	2	Misc	55.7	4,200.0	75.40	8,400	151	100%	8,400	0	0	151
Solid Waste Building Tritium Foil & Target Waste	3		CF	8	Misc	41.0		1.0	328	8	100%	0	328	8	0
Solid Waste Building Scrubber Column Cans (H-3 Contamination)	3		CF	41.5	Misc	41.0		1.0	1,702	42	100%	1,702	0	0	42
Solid Waste Building Sign Waste (H-3 Contamination)	3		CF	168.0	Misc	41.0		1.0	6,888	168	100%	6,888	0	0	168
Solid Waste Building Paper Bag Waste (H-3 Contamination)	3		CF	236.0	Misc	41.0		1.0	9,676	236	100%	9,676	0	0	236
Solid Waste Building Stub Can Waste (H-3 Contamination)	3		CF	18.0	Misc	41.0		1.0	738	18	100%	738	0	0	18
Solid Waste Building Liquid Scint. Vial Waste (H-3 Contamination)	3		CF	47.0	Misc	41.0		1.0	1,927	47	100%	1,927	0	0	47
Solid Waste Building Misc. Waste In Drums (H-3 Contamination)	3		CF	1,481.0	Misc	41.0		1.0	60,721	1,481	100%	60,721	0	0	1,481
Nuclear Building Main Duct (26" x 18")	1		LF	167	Steel	17.6	5.6	0.3	934	53	100%	934	0	0	53
Nuclear Building 4-in Duct	1		LF	100	Steel	5.9	0.9	0.1	86	14	100%	86	0	0	14
Nuclear Building 6-in Duct	1		LF	100	Steel	4.0	1.3	0.3	129	33	100%	129	0	0	33
Nuclear Building 9-in Duct	1		LF	100	Steel	2.6	1.9	0.7	193	73	100%	193	0	0	73
Nuclear Bldg Pump & Fill Hood (10'x2'x3')	1		Ea.	1	Lucite & SST	15.0	900.0	60.0	900	30	100%	900	0	0	30
Nuclear Bldg Measuring Box (3'x2'x2')	1		Ea.	1	Steel & Lucite	20.0	240.0	12.0	240	6	100%	240	0	0	6
Nuclear Bldg Storage Box (3'x2'x2')	1		Ea.	1	Steel & Lucite	20.0	240.0	12.0	240	6	100%	240	0	0	6
Nuclear Bldg Packing Box (4'x2'-8"x2.5')	1		Ea.	1	Steel & Lucite	20.0	532.0	26.6	532	13	100%	532	0	0	13
Nuclear Bldg Sink Hood (5'x2'x2.5')	1		Ea.	1	Lucite & SST	15.0	375.0	25.00	375	13	100%	375	0	0	13
Nuclear Bldg Scrubber Hood	1		Ea.	1	Lucite & SST	15.0	180.0	12.00	180	6	100%	180	0	0	6
Nuclear Bldg Rotary Table Machine	1		Ea.	1	steel	25.0	1,500.00	60.0	1,500	60	100%	1,500	0	0	60
Nuclear Bldg Wash Hood	1		Ea.	1	Lucite & SST	15.0	180.0	12.0	180	6	100%	180	0	0	6
Nuclear Bldg Low Vacuum Pump (Oil Type)	1		Ea.	1	steel	67.0	134.0	2.0	134	2	100%	134	0	0	2
Nuclear Bldg High Vacuum Pump (Oil Type)	1		Ea.	1	steel	60.0	480.0	8.00	480	8	100%	480	0	0	8
Nuclear Bldg Old Oven	1		Ea.	2	stainless	20.0	78.0	3.90	156	4	100%	156	0	0	4
Nuclear Bldg Metal Cooler (3'x1.5'x6')	1		Ea.	1	Lucite & SST	15.0	900.0	60.0	900	30	100%	900	0	0	30
Nuclear Bldg Cutting Box (3'x2'x2')	1		Ea.	1	Lucite & SST	15.0	900.0	60.0	900	30	100%	900	0	0	30
Nuclear Bldg Leak Detector, Varian (3'x2.2'x3')	1		Ea.	1	steel	30.0	1,800.0	60.0	1,800	30	100%	1,800	0	0	30
Nuclear Bldg Fill Room Ceiling Tiles (2'x2'x3/4")	1		S.F.	240	Fiberglass	20.0	1.3	0.06	300	15	100%	300	0	0	23
Nuclear Bldg Fill Room Floor Tiles (9"x9"x1/8")	1		S.F.	240		62.4	1	0.01	156	3	100%	156	0	0	4
								TOTALS:	**942,084**	**18,616**	**100%**	**941,756**	**328**	**8**	**18,617**

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 03214
Status Code: 0
Fee Category: 3B
Exp. Date: 20041231
Fee Comments: ALWAYS
Decom Fin Assur Reqd: Y

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
   Applicant/Licensee: SAFETY LIGHT CORP.
   Received Date: 20001207
   Docket No: 3005982
   Control No.: 128944
   License No.: 37-00030-08
   Action Type: Fin. Assurance

2. FEE ATTACHED
   Amount: _____
   Check No.: _____

3. COMMENTS

Signed M. A. Perkins
Date 12/12/2000

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /__/)

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:
   Amendment _____
   Renewal _____
   License _____

3. OTHER _____
   _____

Signed _____
Date _____

This is to acknowledge the receipt of your letter/application dated

12/06/2000, and to inform you that the initial processing which includes an administrative review has been performed.

FINANCIAL ASSURANCE 37-00030-08

☑ There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

_____.

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 128944. When calling to inquire about this action, please refer to this control number. You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader